| Name:                     | Uneah                             |
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| Invigilator's Signature : |                                   |

# CS/B.Tech/CSE(0)/IT(0)/SEM-5/CS-501/2012-13 2012

## **OPERATING SYSTEM**

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

#### **GROUP - A**

## (Multiple Choice Type Questions)

- 1. Choose the correct alternatives for any ten of the following :  $10 \times 1 = 10$ 
  - i) A multi-user, multiprocessing operating system cannot be implemented on hardware that does not support
    - a) address translation
    - b) DMA for disk transfer
    - c) at least two modes of CPU execution ( privileged and non-privileged )
    - d) demand paging.
  - ii) A benefit of the microkernel organization is
    - a) extensibility
- b) portability
- c) flexibility
- d) all of these.

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- The technique of gradually increasing the priority of a iii) process that wait in a system for a long time is known as blocking b) ageing a) c) starvation d) convoy effect.
- Which of following reduces degree iv) the of multiprogramming?
  - Mid-term scheduler a) Long-term scheduler b)
  - Short-term scheduler d) All of these. c)
- A critical section is a program segment v)
  - which avoids deadlock a)
  - b) which should run in a certain specified amount of time
  - c) which shared resources that are accessed
  - d) which must be enclosed by a pair of semaphores operation, p and v.
- A computer system has 6 tape drives, with n processes vi) competing for them. Each process may need 2 tape drives. The maximum value of n for which the system is guaranteed to be deadlock free is
  - a) 6

5 b)

c) 4 d) 3.





| vii)  | Banker's algorithm solves the problem of  |   |    |                        |
|-------|---|---|----|------------------------|
|       | a)  | deadlock avoidance                              | b) | context switching      |
|       | c)  | deadlock recovery                               | d) | mutual exclusive.      |
| viii) | An address generated by the CPU is commonly referr to as  |   |    |                        |
|       | a)  | logical address                                 | b) | physical address       |
|       | c)  | relational address                              | d) | virtual address        |
| ix)   |   | ch of the following p<br>ers from Belady's anom | _  | replacement algorithms |
|       | a)  | Optimal replacement                             | b) | FIFO                   |
|       | c)  | LRU   | d) | Both (a) and (c).      |
| x)    | Which of the following RAID levels implements some form of parity calculations to introduce redundancy? |   |    |                        |
|       | a)  | RAID Level 2                                    | b) | RAID Level 4           |
|       | c)  | RAID Level 6                                    | d) | All of these.          |
| xi)   | The time to move the disk arm to the desired cylinder in a hard disk is known as                        |   |    |                        |
|       | a)  | Rotainaly latency                               | b) | Positioning time       |
|       | c)  | Indexed   | d) | Hashed.                |
|       |   |   |    |                        |

### **GROUP - B**

## (Short Answer Type Questions)

Answer any three of the following.



- 2. a) What is race condition?
  - b) Explain Peterson solution for avoiding race condition.

2 + 3

- 3. a) Why are page sizes always power of 2?
  - b) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames.
    - i) How many bits are there in the logical address?
    - ii) How many bits are there in the physical address? 3+2
- 4. What are co-operating processes? Discuss the advantages of co-operating process. 2+3
- 5. What is priority scheduling ? Can SJF scheduling be considered as priority scheduling ? Justify. 3+2

## **GROUP - C**

## (Long Answer Type Questions)

Answer any *three* of the following.  $3 \times 15 = 45$ 

- 6. a) What is context switching? Why is it considered to be an overhead? 2+2
  - b) All unused states may not lead to deadlock.

"Why or why not"?

3

c) Consider the following set of processes, with the length of the CPU-burst time given in millisecond:

| Process |    | Burst Time | <b>Arrival Time Priority</b> |  |
|---------|----|------------|------------------------------|--|
| $P_{1}$ | 10 | 0          | 3                            |  |
| $P_2$   | 1  | 1          | 1                            |  |
| $P_3$   | 2  | 2          | 3                            |  |
| $P_4$   | 1  | 2          | 4                            |  |
| $P_{5}$ | 5  | 3          | 2                            |  |

- i) Draw 2 Gantt charts. Illustrate the execution of these processes a non-pre-emptive priority ( a smaller priority number implies a higher priority ) and a RR ( quantum = 1 ) scheduling.
- ii) What is turnaround time of each process for each of the scheduling algorithms? Also find the average turnaround time of the system?
- iii) What are the average waiting time for 2 algorithms? 3+1+1
- d) Mention one characteristic each of time sharing system,Batch processing system and distributed system. 3

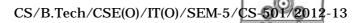
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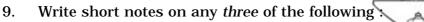
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| 7. | a) | Differentiate   | between | multiprogramming and              |
|----|----|-----------------|---------|-----------------------------------|
|    |    | multitasking OS | S.      | A Annua (Ven. 1 - and Established |

- b) What is semaphore? What are the different types of semaphore? 2+3
- c) What is the Dining philosopher problem? Device an algorithm to solve the problem using semaphore. 3 + 3
- d) Differentiate between starvation and deadlock. 2
- 8. a) What are TLB? Draw the diagram of paging hardware with TLB. 1+2
  - b) i) Consider a paging system with the page table stored a paged memory reference take.
    - ii) If we add TLBs and 75 per cent of all page-table references are found in the TLBs what is the effective memory reference time? (Assume that finding a page table Entry in the TLBs takes zero time, if the entry is there.) 2+2
  - c) Given memory partitions of 100 kb, 500 kb, 200 kb and 600 kb (in order), how would each of the first fit, best-fit and worst-fit algorithms place process of 212 kb, 417 kb, 112 kb and 426 kb (in order)? Which algorithm makes the most efficient use of memory.
  - d) What is dynamic loading? What is dynamic linking?

3 + 3







- a) RR scheduling
- b) DMA and its utility
- c) RAID
- d) Middle term scheduler
- e) Linked file allocation technique
- f) Boot block and bad block.

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